STA 5934: Topics in Bayesian Statistics and Bayesian Nonparametrics
MWF 12:20PM — 1:10PM, Room: OSB 215

Instructor: Dr. Antonio Linero, OSB 201E.
Office Hours: 10:00AM — 12:00PM Wednesday, or by appointment.
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Prerequisites: Students should possess a background that includes statistical inference and distribution theory, as well as regression at a graduate level and basic competency in computational methods. We will also use measure-theoretic foundations for probability as required.

Course Website: Course website is available at `canvas.fsu.edu`.

Textbook: Relevant readings will be given throughout the course; *Bayesian Data Analysis*, 3rd by Gelman, Carlin, Stern, Dunson, Vehtari, and Rubin is a recommended text for this course, but is not required.

Software: The examples in this course will use the `R` programming language, available at `www.r-project.org`. See also `www.rstudio.com` for a nice development environment.

Course Topics: Major topics in this course will include:

- basics of Bayesian inference;
- performing inference using Markov chain Monte Carlo;
- Dirichlet processes, with related extensions and modifications;
- Gaussian process regression;
- Bayesian decision tree ensembles;
- the horseshoe and related priors for high-dimensional linear models;
- posterior convergence and contraction rates for nonparametric and high-dimensional models.

Homework: Homework to be collected will be posted on the course website. Homework will account for 80% of your grade.

Course Project: At the end of the course, students (and/or groups of students) will give a presentation on a topic in Bayesian nonparametrics of their choice. Possible project topics include:

> Probability tensor factorizations; hierarchical Dirichlet processes; Indian Buffet processes; normalized random measures; gamma processes for survival analysis; Bayesian nonparametric regression on manifolds; deep Gaussian processes; Bayesian neural networks and variational autoencoders.

Details on the project will be given later in the course.

Grading: Your grade for the semester will be determined from scores on the homework (80%) and on the course project (20%). Grade cutoffs will be established at the end of the course, but will not be stricter than the following cutoffs.

- $\geq 94\%$: A;
- $\geq 90\%$: A-;
- $\geq 87\%$: B+;
- $\geq 83\%$: B;
- $\geq 80\%$: B-;
- $\geq 77\%$: C+;
- $\geq 73\%$: C;
- $\geq 70\%$: C-;
- $\geq 67\%$: D+;
- $\geq 63\%$: D;
- $\geq 60\%$: D-;
- $< 60\%$: F;